

CURRENT LITERATURE

NOTES FOR STUDENTS

The wilting coefficient.—The importance in ecological work of some method of determining what portion of the soil moisture is available for the growth of plants caused ecologists to welcome the "wilting coefficient" of BRIGGS and SHANTZ¹ as an important constant for the investigation of plant associations. The general conclusion that for any given soil the wilting coefficient is largely independent of the kind of plant or of the external conditions under which the plant grew and wilted was directly at variance with the ideas of plant physiologists and was soon questioned. Unfortunately, in the extensive and careful experiments of BRIGGS and SHANTZ there was no exact quantitative description of the atmospheric factors under which the experiments were carried out. Limiting these factors rather definitely, CALDWELL² found that only when wilting was slowly brought about under rather moist conditions was the wilting coefficient, or "the ratio of soil moisture content at permanent wilting," the same as that determined by BRIGGS and SHANTZ. Similar plants placed under the high transpiration condition of the desert atmosphere at Tucson wilted with a soil moisture content 30-40 per cent in excess of the wilting coefficient for the humid aerial conditions, the difference being greatest in soils with a low saturation capacity, although under a given set of atmospheric conditions the wilting coefficient was approximately a constant for each of the soils used. In order that the wilting coefficient may be determined solely by soil conditions, therefore, it is only necessary that the evaporating power of the air shall not exceed a certain limit, but where this limit lies, beyond which this coefficient is decidedly greater than that determined by BRIGGS and SHANTZ, was not determined.

BLACKMAN³ has recently reviewed the situation, including CRUMP'S⁴ new method of expressing the soil moisture (coefficient of humidity) and has aptly pointed out what appears to be some of the important related ecological problems of the water relations of plants urgently requiring investigation. They are (1) the confirmation of the results of BRIGGS and McLANE (on the moisture equivalent of soils), and of BRIGGS and SHANTZ; and (2) how far the formula

¹ See BOT. GAZ. 53:20-37, 229-235. 1912.

² CALDWELL, J. S., The relation of environmental conditions to the phenomenon of permanent wilting in plants. *Physiol. Res.* 1:1-56. 1913.

³ BLACKMAN, V. H., The wilting coefficient of the soil. *Jour. Ecol.* 2:43-50. 1914.

⁴ See review in BOT. GAZ. 57:85. 1914.

devised by BRIGGS and SHANTZ to express the wilting coefficient in terms of soil composition is capable of simple modification for higher rates of transpiration. As there seems to be no reason at all to doubt the experimental accuracy of the work of BRIGGS and SHANTZ, especially when their extensive character is taken into consideration, the second of these problems would seem to offer a favorable field for further experimentation, with a strong probability of results that would be useful in many phases of ecological study. Indeed, the most recent paper upon the subject by SHIVE and LIVINGSTON⁵ makes an unsuccessful attempt at a determination of the limits within which the formula of BRIGGS and SHANTZ does apply. It confirms the results of CALDWELL, further emphasis being given to the fact that for the soils of high water-holding powers the wilting coefficient, or the "soil moisture residue at permanent wilting" as SHIVE and LIVINGSTON prefer to call it, even with high evaporating power of the air, is but little above, in fact, in some instances, is slightly below that obtained by the direct methods of BRIGGS and SHANTZ. This paper also contains an attempt to express by an algebraic equation the relation of the wilting coefficient to the evaporation intensity under which wilting was brought about, but the results are so diverse that only a rather wide approximation is obtained. The general conclusion seems to be that the formula of BRIGGS and SHANTZ holds within certain limits, as yet undetermined, but doubtless within atmospheric conditions of comparatively low evaporation intensity.—GEO. D. FULLER.

Ecology of fresh-water algae.—COMERE⁶ has published a general account of the ecology of the fresh-water algae. The paper itself is so nearly a summary of the results of investigations by the author and other European limnologists, that it is difficult to condense the matter further. The paper is divided in three parts, the first of which considers the classification and nomenclature of aquatic formations, the separation of these formations into characteristic regions, and the arrangement and terminology of the "florules" corresponding to these regions. This part is especially useful because of its concise definitions and citations of synonyms. Algal habitats are primarily divided into aquatic and subaerial. The former are further separated into permanent and transient groups. The algal formations are first divided into those of large lakes, small lakes, and streams. In these there may be further recognized the littoral, planctonic, and bottom regions, each with its corresponding florule. The subdivisions are too numerous to mention here, but this will suffice to show that

⁵ SHIVE, J. W., and LIVINGSTON, B. E., The relation of atmospheric evaporating power to soil moisture content at permanent wilting in plants. *Plant World* 7:81-121. 1914.

⁶ COMERE, JOSEPH, De l'action du milieu considérée dans ses rapports avec la distribution générale des Algues d'eau douce. *Mém. 25, Bull. Soc. Bot. France* 16: 1-96. 1913.